EKI-1121L, EKI-1122L, EKI-1124L

1/2/4 Serial Port, Dual Ethernet, Linux-based Embedded Platform User's Manual

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4. Carefully pack the defective product, a completely filled-out Repair and Replacement Order Card and a photocopy of dated proof of purchase (such as your sales receipt) in a shippable container. A product returned without dated proof of purchase is not eligible for warranty service.

5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Chapter 1: Introduction

1.1 Overview

The EKI-1121L/1122L/1124L is a Linux-based RISC-grade embedded platform that offers 2 LAN and 1/2/4 serial ports.

EKI-1121L/1122L/1124L could operate well under 0~60℃. Its compact size and light weight could fit in industrial robust environment. With these advantages, EKI-1121L/1122L/1124L is suitable for communication gateway for converting communication protocol.

EKI-1121L/1122L/1124L is a perfect embedded ready platform that can shorten your development time and offer rich networking interfaces to fulfill your diverse requirements.

1.2 Features

- Winbond ARM7 W90N740 80MHz Processor
- 16 MB SDRAM onboard, 8 MB Flash
- 1/2/4 independent RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet
- 1 channel LED for user define
- Ready platform for Linux build in flash
- Compact size and light weight
- 0~60℃ wide range operation temperature
- DIN-rail and wall mounting
- 10/100 Mbps Base-T standard
- Surge protection for RS-485 line and power supply
- Automatic RS-485 data flow control

1.3 Specifications

- Boot-loader: Redboot
- Kernel version: uClinux 2.4.31-uc0
- C Library: uClibc 0.9.26
- OS boot up time <= 9 seconds
- Independent hardware watchdog timer
- Real-time clock with battery
- Ethernet communication compatibility: IEEE 802.3, IEEE802.3u
- Protocols: IPv4, ARP, ICMP, UDP, TCP, HTTP, SNMP v1/v2c, NTP, FTP,

TFTP, TELNET, PAP, CHAP, DHCP, PPP, PPPoE, NFS, SMTP

- Interfaces:
  - Network: 2 10/100 BASE-T Ethernet ports
  - Serial: 1/2 independent RS-232/422/485 serial ports
- Serial ports:
  - EKI-1121L: 1 independent RS-232/422/485 serial port
  - EKI-1122L: 2 independent RS-232/422/485 serial ports
  - EKI-1124L: 4 independent RS-232/422/485 serial ports
- Connectors:
  - Network: RJ-45
  - Serial: DB9
- Transmission speed: 50 bps to 921 Kbps
- Parity bit: Odd, Even, None, Space, Mark
- Data bits: 5, 6, 7, 8
- Stop bits: 1, 1.5, 2
- Flow Control: None, Xon/Xoff, RTS/CTS, DTR/DSR
- Data Signals:
  - RS-232: TxD, RxD, CTS, RTS, DTR, DSR, DCD, RI, GND
  - RS-422: TxD+, TxD-, RxD+, RxD-, GND
  - RS-485: Data+, Data-, GND
- Diagnostic LEDs:
  - Power
  - Programmable Status LED
  - Network: Link, Active
  - Serial: Tx, Rx
- Power Requirements: Dual unregulated 12 to 48 Vdc with surge protection
- Power Consumption:
  - EKI-1121L: 2 W
  - EKI-1122L: 2.5 W
  - EKI-1124L: 4 W
- Enclosure: Metal with solid DIN rail or panel mounting hardware
- Serial protection: 15KV ESD
- Ethernet protection: Built-in 1.5 KV magnetic isolation
- Operation Temperature: 0 ~ 60℃(32 ~ 140℉)
- Storage Temperature: -20 ~ 80℃(-4 ~ 176℉)
- Operating Humidity: 20 ~ 95% (non-condensing)
- Storage Humidity: 0 ~ 95%(non-condensing)

1.4 Packing List

- EKI-1121L/1122L/1124L
- CD-ROM for BSP
- One loop-back DB-9 connector

Chapter 2: Getting Started

In this chapter, you will be given an overview of the EKI-1121L/1122L/1124L hardware installation procedures. As mentioned in the previous chapter, the EKI-1221L/1222L/1224L comes ready with all network connections, including Ethernet and RS-232/422 /485 port connections.

2.1 Understanding the EKI-1121L/1122L/1124L

2.2 Hardware

The following instructions will give the overview of EKI-1121L/1122L/1124L hardware and its installation.

2.2.1 LED Indicators

There are LEDs indicating the two sets of power status, system status, dual networks status and serial communication status on the front panel of EKI-1121L, EKI-1122L, and EKI-1124L. Each of them has its own specific meaning, please refer to the below table.

Table 2.2 EKI-1121L/1122L/1124L LED Indicators

LED Name	LED Color	LED Description
P1	Green	Power 1 is on.
	Off	Power 1 is off, or power error condition exists.
P2	Green	Power 2 is on.
	Off	Power 2 is off, or power error condition exists.
Status (Default behavior)	Orange	Blinking: System is ready.
	Off	System is not working.
Ethernet	Orange	Blinking: Ethernet port is transmitting or receiving data. Steady on: Ethernet has the good link for 10Mbps or 100Mbps operations.
	Green	On: 100Mbps Ethernet connection. Off: 10Mbps Ethernet connection.
Serial	Orange	Serial port is transmitting data.

	Green	Serial port is receiving data.
	Off	No data is transmitted or received through the serial port.

2.2.2 Dimensions (Units: mm)

EKI-1121L:

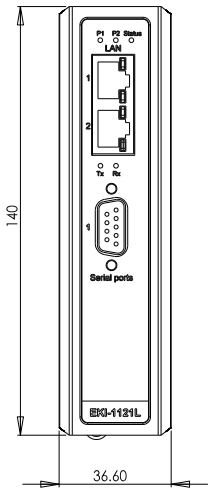

Figure 2.3 Front View of EKI-1121L

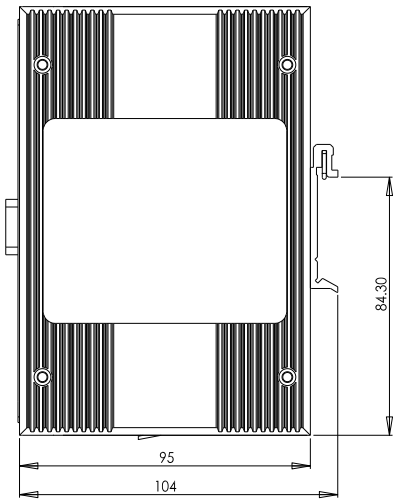

Figure 2.4 Side View of EKI-1121L

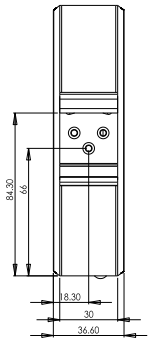

Figure 2.5 Back View of EKI-1121L

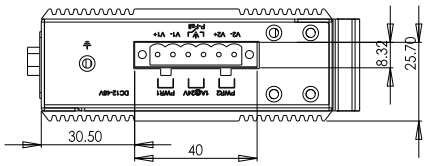

Figure 2.6 Top View of EKI-1121L

EKI-1122L:

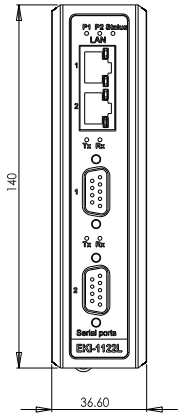

Figure 2.7 Front View of EKI-1122L

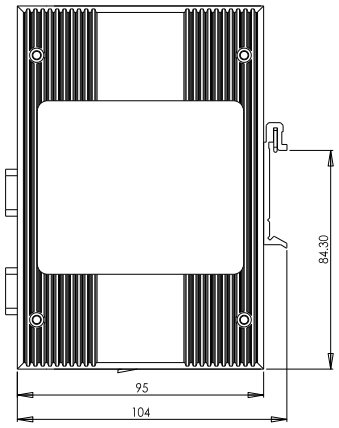

Figure 2.8 Side View of EKI-1122L

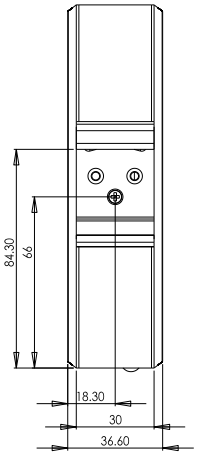

Figure 2.9 Back View of EKI-1122L

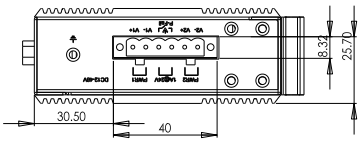

Figure 2.10 Top View of EKI-1122L

EKI-1124L:

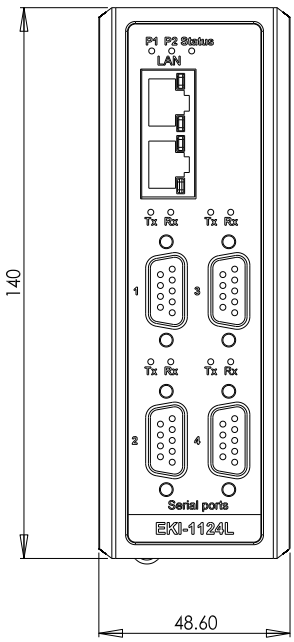

Figure 2.11 Front View of EKI-1124L

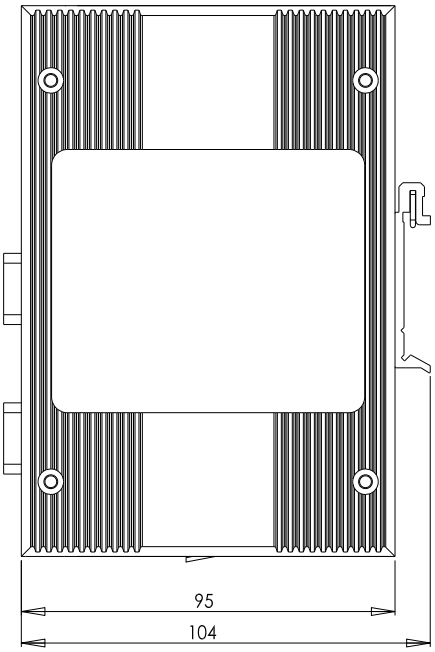

Figure 2.12 Side View of EKI-1124L

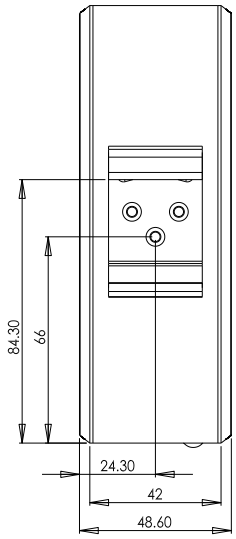

Figure 2.13 Back View of EKI-1124L

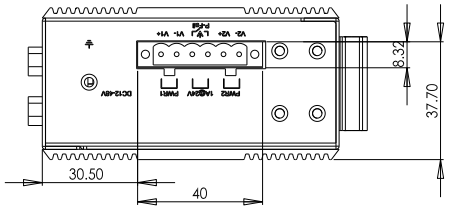

Figure 2.14 Top View of EKI-1224L

2.3 Connecting Hardware

This section will explain how to find a proper location for your

EKI-1121L/1122L/1124L and how to connect to the network, hock up the power cable and connect to the EKI-1121L/1122L/1124L.

2.3.1 Choosing the Location

Due to its versatility and innovative design, the EKI-1122L/1122L/1124L can be:

- Fixed to a panel mount
- Fixed to a DIN-rail

- **Panel/Wall Mounting**

The EKI-1121L/1122L/1124L can be attached to a wall using the included metal brackets. Each bracket comes with four screws. You can install the EKI-1121L/1122L/1124L firmly via the components, please see the figure below.

Figure 2.15 Combine the Metal Mounting Kit

- **DIN-rail Mounting**

The EKI-1121L/1122L/1124L can be mounted on a standard DIN-rail. The DIN-rail kit is screwed on the Modbus data gateway when out of factory. If the DIN-rail kit is not screwed on the EKI-1121L/1122L/1124L, please screw the DIN-rail kit on the Modbus data gateway first.

First, hang the EKI-1121L/1122L/1124L to the DIN-rail with angle of inclination. Please see the figure below.

Figure 2.16 Din-rail Step1

Then, let the EKI-1121L/1122L/1124L down straight to slide over the rail smoothly.

Figure 2.17 Din-rail Step2

2.3.2 Connecting Power

The EKI-1121L/1122L/1124L supports dual 12 to 48 VDC power inputs and a power-fail relay output. Below figure is the power terminal block pin assignments. Please refer it to connect to the proper power and polarity.

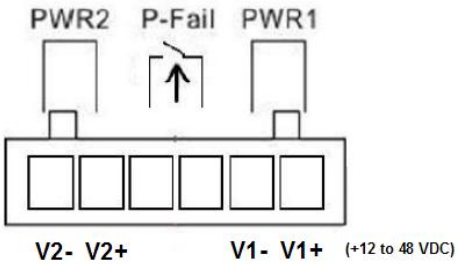

Figure 2.18 Power Connector

You can connect an alarm indicator, buzzer or other signaling equipment

through the power-fail relay output. The relay opens if power input V1 or V2 fails. (“Open” means if you connect relay output with an LED, the light will be turned off)

2.3.3 Connecting Serial Device

The EKI-1121L/1122L/1124L provides one, two or four standard serial ports DB9 (male) connectors. RS-232/422/485 pin assignments are as below.

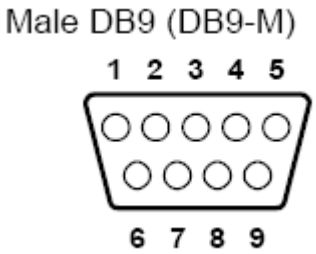

Table 2.3 EKI-1121L/1122L/1124L Serial Port Pin Assignments

Pin	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
RS-232	DCD	RX	TX	DTR	GND	DSR	RTS	CTS	RI
RS-422	TX-	-	-	TX+	GND	-	RX+	-	RX-
RS-485	Data-	-	-	Data+	GND	-	-	-	-

2.3.4 Connecting to a Host or the Network

The EKI-1121L/1122L/1124L provides two RJ45 connectors with dual independent Ethernet networks and supports 10/100 Mbps transmission speed. The EKI-1121L/1122L/1124L will automatically detect current transmission speed on the network and configure itself accordingly. For normal operation, the EKI-1121L/1122L/1124L can be connected to other hubs or switches through a twisted-pair straight through the Ethernet cable. For configuration or troubleshooting purposes, user may need to connect the EKI-1121L/1122L/1124L directly to the host PC. In this operation mode, user can use a crossover Ethernet cable to connect the EKI-1121L/1122L/1124L to the host PC’s Ethernet connector.

Chapter 3: Installation and Configuration

3.1 Connecting the Hardware

> Use 115200 bps, N81 to connect console.

The EKI-1121L/1122L/1124L offers an easy setup feature. Take out the EKI-1121L/1122L/1124L and the accessories from the package and follow the steps below for initial setup:

1. Connect the EKI-1121L/1122L/1124L LAN1 to your network with standard RJ-45 connector.
2. Use the console cable inside the release package to connect the console port on EKI-1121L/1122L/1124L with serial port on your develop desktop.
3. Use your familiar console application to open the serial port, such as: ~~Super~~ HyperTerminal on Windows, minicom on Linux, third party application Netterm, or kind of. Use baud rate 115200 bps, no parity, 8 bits data length and 1 stop bit.
4. Connect the power cord to the EKI-1121L/1122L/1124L and plug the other end of the cord into the power outlet. Then boot the EKI-1121L/1122L/1124L immediately. The boot up process may need about 9 seconds till the uClinux operation system is ready.
5. After power on, you can see the boot up messages like below.

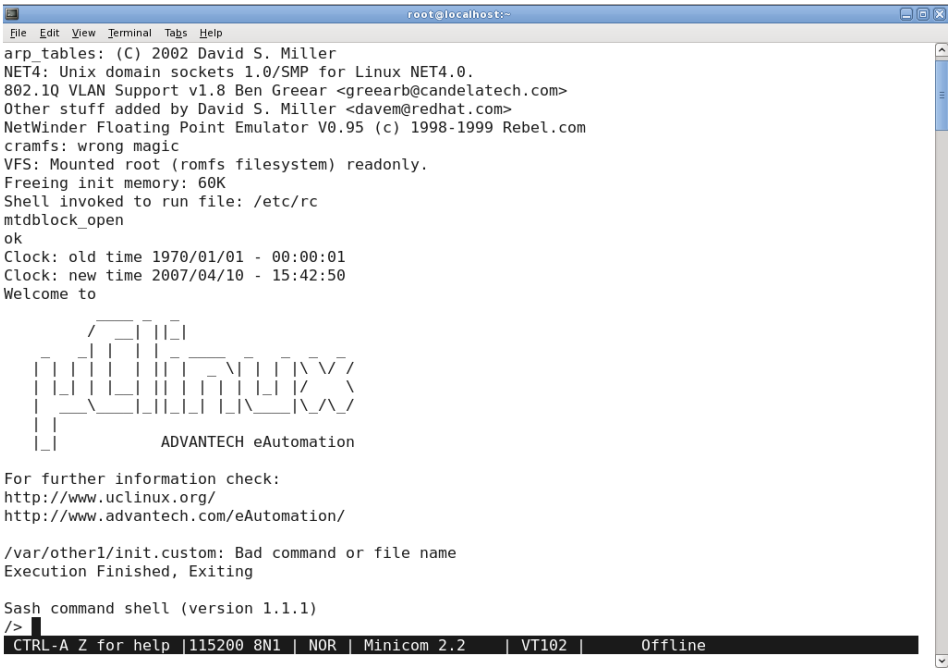
root@localhost:~
File Edit View Terminal Tabs Help
arp_tables: (C) 2002 David S. Miller
NET4: Unix domain sockets 1.0/SMP for Linux NET4.0.
802.1Q VLAN Support v1.8 Ben Greear <greearb@candelatech.com>
Other stuff added by David S. Miller <davem@redhat.com>
NetWinder Floating Point Emulator V0.95 (c) 1998-1999 Rebel.com
cramfs: wrong magic
VFS: Mounted root (romfs filesystem) readonly.
Freeing init memory: 60K
Shell invoked to run file: /etc/rc
mtdblock_open
ok
Clock: old time 1970/01/01 - 00:00:01
Clock: new time 2007/04/10 - 15:42:50
Welcome to
ADVANTECH eAutomation
For further information check:
http://www.uclinux.org/
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (version 1.1.1)
/>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.1 The boot up messages

6. When you see the prompt, the system is ready.

Note:

1. Use direct cable rather than cross-over cable; otherwise there is no message shown to you!

2. If you power on before open minicom, you can not see the boot up messages like that. But the boot up process may be successful.

3.2 OS Configuration and Usage

Before configure and use, user must release other1.tar.gz files to /var. because it includes all of configured files.

3.2.1 Configure RTC

Use the data command to modify the date.

Usage: date [OPTION] … [MMDDhhmm[[CC]YY][.ss]][+FORMAT]

For example, Tue Apr 10 15 :39 :12 UTC 2007. You can type in "date 041015392007.12" to update system date.

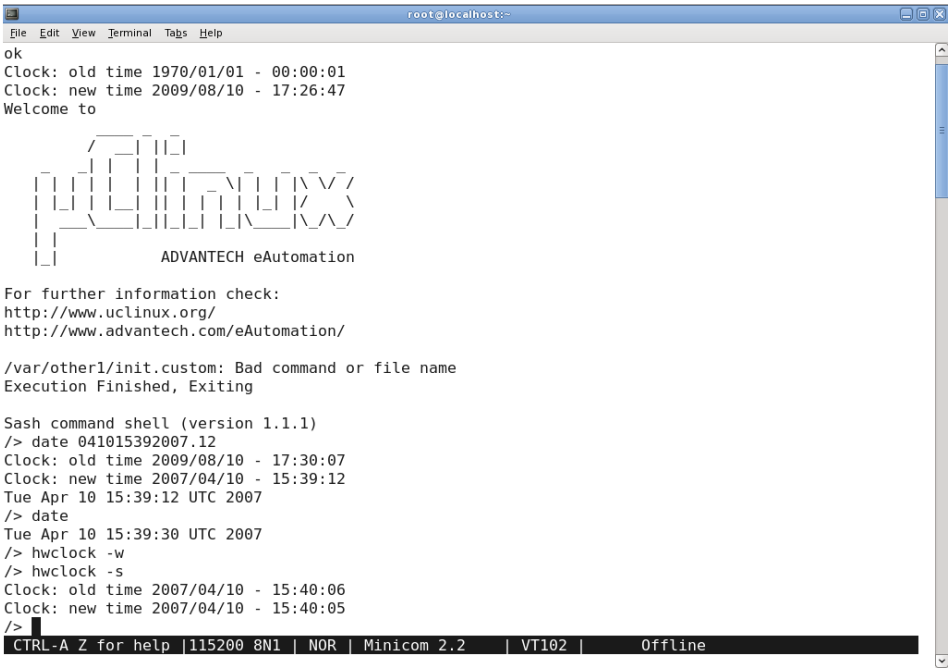
root@localhost:~
File Edit View Terminal Tabs Help
ok
Clock: old time 1970/01/01 - 00:00:01
Clock: new time 2009/08/10 - 17:26:47
Welcome to
ADVANTECH eAutomation
For further information check:
http://www.uclinux.org/
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (version 1.1.1)
/> date 041015392007.12
Clock: old time 2009/08/10 - 17:30:07
Clock: new time 2007/04/10 - 15:39:12
Tue Apr 10 15:39:12 UTC 2007
/> date
Tue Apr 10 15:39:30 UTC 2007
/> hwclock -w
/> hwclock -s
Clock: old time 2007/04/10 - 15:40:06
Clock: new time 2007/04/10 - 15:40:05
/>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.2 Configure RTC

In order to maintain the correct time when power off, user should use the ‘hwclock -w’ to write the current system time to real time clock and use the ‘hwclock -s’ to read the real time clock into system.

Now if you reboot the EKI-1121L/1122L/1124L, the time is still correct. Because command ‘hwclock -s’ in /etc/rc(/var/other1/init.custom) executes by default.

3.2.2 Configure IP

After connect to the console and power on the device, you can use following command to enable Ethernet or you can modify the /etc/rc(/var/other1/init.custom) file to bring up Ethernet when booting up by default.

3.2.2.1 Using Static IP

User can modify the /etc/rc(/var/other1/init.custom) file like below to make system boot up using static IP. /etc/rc(/var/other1/init.custom) will be executed when system boot up if the file exists.

```
ifconfig eth0 10.0.0.1 broadcast 10.0.0.255 netmask 255.255.255.0
```

And user can configure IP address with command line. For example:

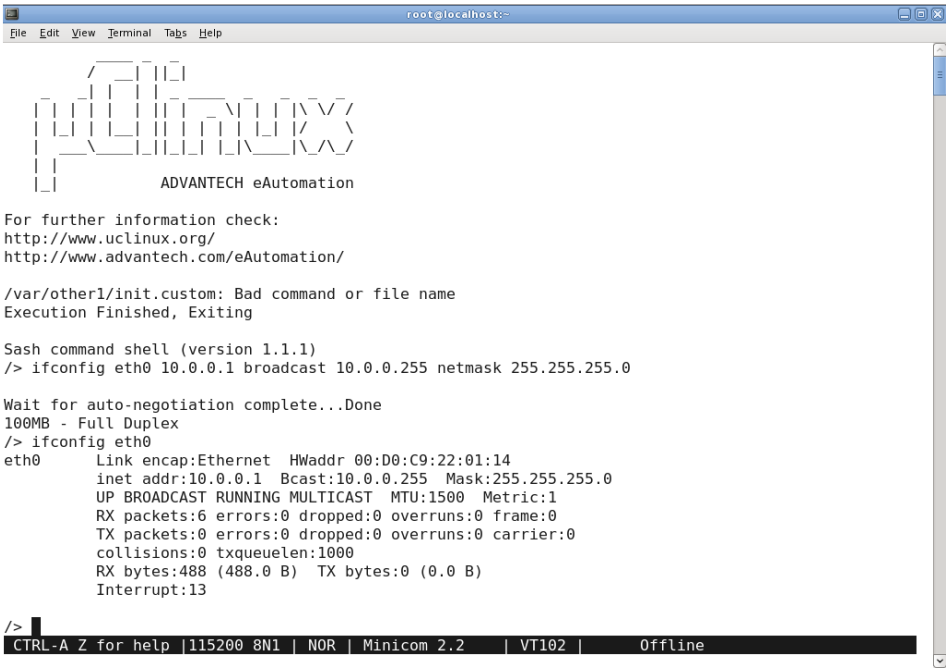
root@localhost:~
File Edit View Terminal Tabs Help
ADVANTECH eAutomation
For further information check:
http://www.uclinux.org/
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (version 1.1.1)
/> ifconfig eth0 10.0.0.1 broadcast 10.0.0.255 netmask 255.255.255.0
Wait for auto-negotiation complete...Done
100MB - Full Duplex
/> ifconfig eth0
eth0 Link encap:Ethernet HWaddr 00:D0:C9:22:01:14
inet addr:10.0.0.1 Bcast:10.0.0.255 Mask:255.255.255.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:6 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:488 (488.0 B) TX bytes:0 (0.0 B)
Interrupt:13
/>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.3 Configure Ethernet Interface Using Static IP

3.2.2.2 Using DHCP

User can modify the /etc/rc(/var/other1/init.custom) file like below to make system boot up using DHCP.

```
dhcpcd eth0 &
```

And user can obtain IP address with command line. For example:

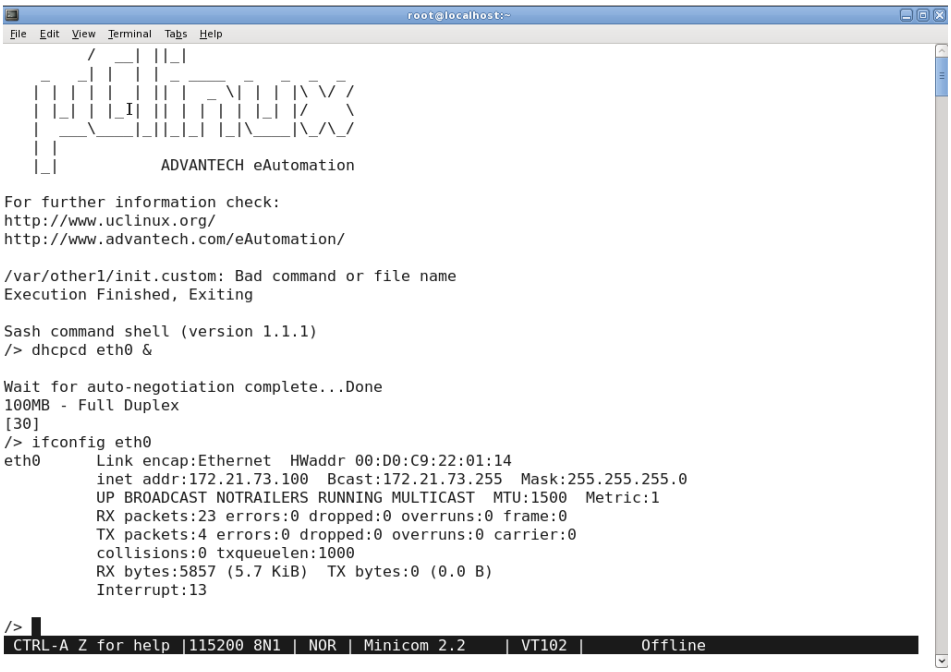
root@localhost:~
File Edit View Terminal Tabs Help
ADVANTECH eAutomation
For further information check:
http://www.uclinux.org/
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (version 1.1.1)
/> dhcpcd eth0 &
Wait for auto-negotiation complete...Done
100MB - Full Duplex
[30]
/> ifconfig eth0
eth0 Link encap:Ethernet HWaddr 00:D0:C9:22:01:14
inet addr:172.21.73.100 Bcast:172.21.73.255 Mask:255.255.255.0
UP BROADCAST NOTRAILERS RUNNING MULTICAST MTU:1500 Metric:1
RX packets:23 errors:0 dropped:0 overruns:0 frame:0
TX packets:4 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:5857 (5.7 KiB) TX bytes:0 (0.0 B)
Interrupt:13
/>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.4 Configure Ethernet Interface Using DHCP

3.2.3 TELNET Service and Client

When boot up the EKI-1121L/1122L/1124L, the telnet service is already started by default. User can telnet to EKI-1121L/1122L/1124L by telnet client in another computer. After you telnet into the EKI-1121L/1122L/1124L, all the other operations is the same as using console. And you can telnet to other computer by telnet client in EKI-1121L/1122L/1124L as well. Use command like this:

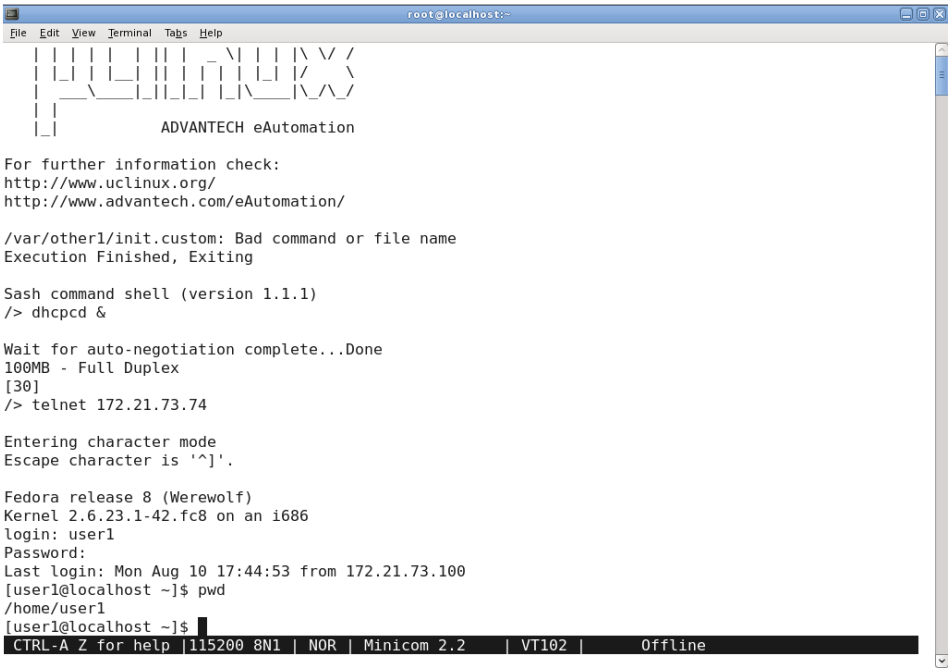

Figure 3.5 TELNET Service and Client

3.2.4 FTP Service and Client

When boot up the EKI-1121L/1122L/1124L, the ftp service is already started by default. User can ftp to EKI-1121L/1122L/1124L by ftp client in another computer to get and put files.

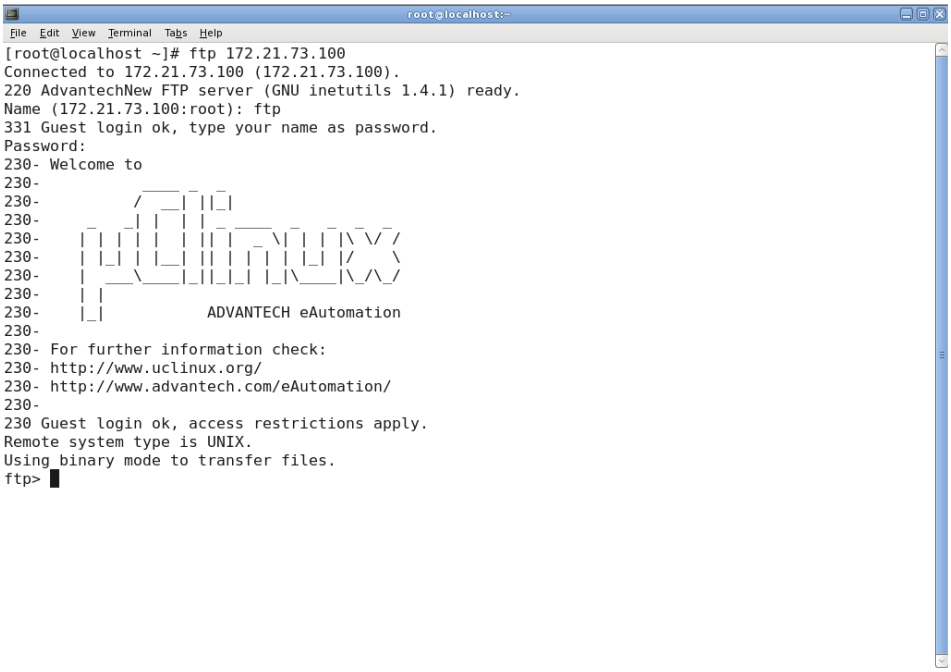

Figure 3.6 FTP Client in Another Computer

‘172.21.73.100’ is your EKI-1121L/1122L/1124L’s IP address. ‘Name’ can be ‘anonymous’ or ‘ftp’ and ‘Password’ can be any or none.

Use command to get and put file like this:

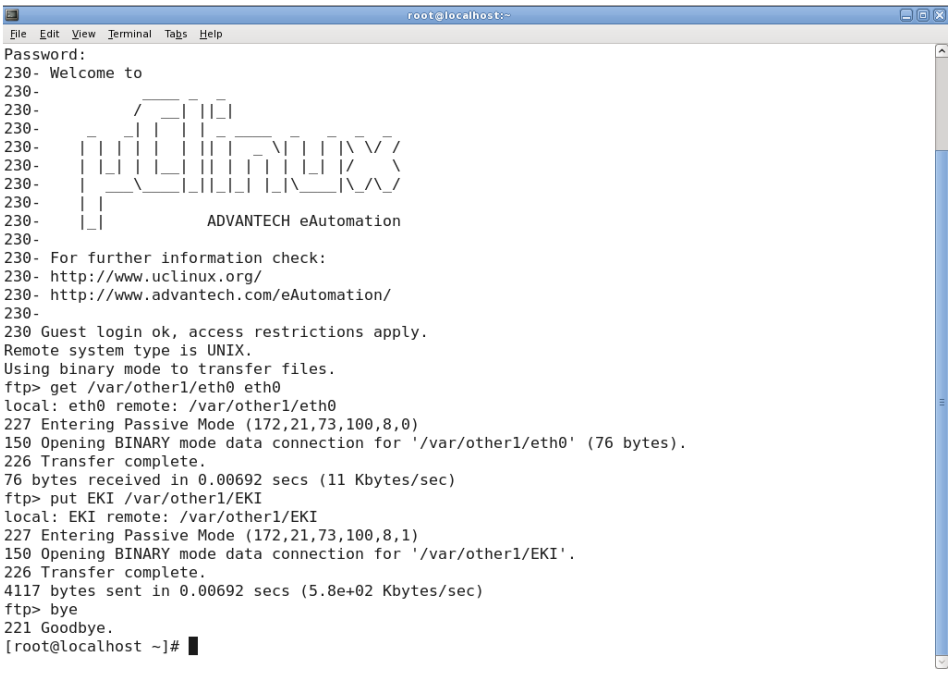

Figure 3.7 FTP Command in Another Computer

Please look at ‘get’ and ‘put’ command line. In ‘get’ command line, user must use full path of file that will be transmitted from EKI-1121L/1122L/1124L to a local file with the same name. In ‘put’ command line, user must use full path of file of EKI-1121L/1122L/1124L and the file name must be same as that will be put.

If user wants to connect other computers by ftp client in EKI-1121L/1122L/1124L, use command to put and get file like this:

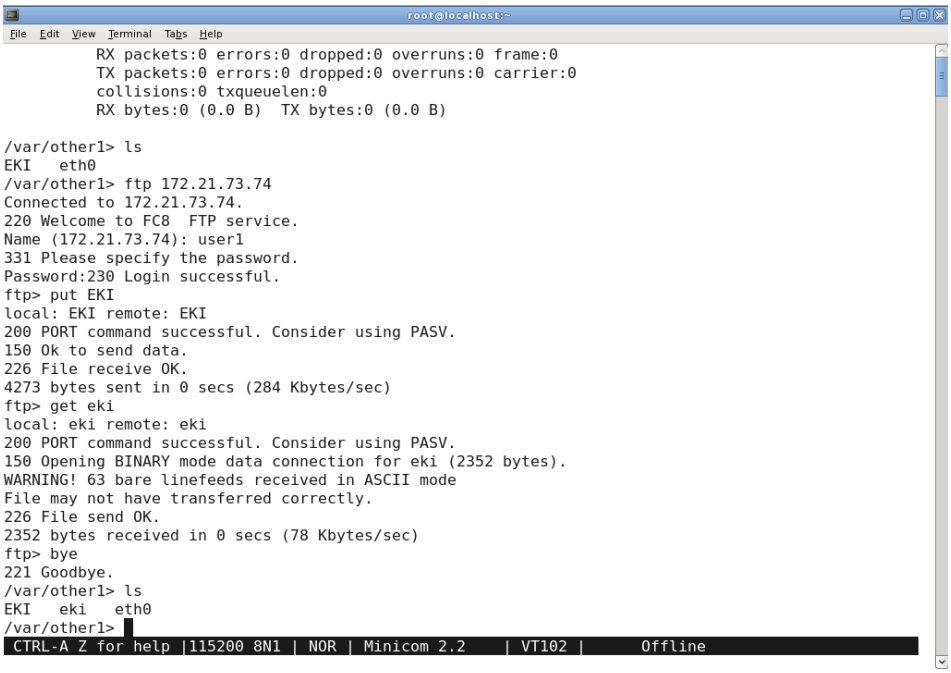
root@localhost:~
File Edit View Terminal Tabs Help
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
/var/other1> ls
EKI eth0
/var/other1> ftp 172.21.73.74
Connected to 172.21.73.74.
220 Welcome to FC8 FTP service.
Name (172.21.73.74): user1
331 Please specify the password.
Password:230 Login successful.
ftp> put EKI
local: EKI remote: EKI
200 PORT command successful. Consider using PASV.
150 Ok to send data.
226 File receive OK.
4273 bytes sent in 0 secs (284 Kbytes/sec)
ftp> get eki
local: eki remote: eki
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for eki (2352 bytes).
WARNING! 63 bare linefeeds received in ASCII mode
File may not have transferred correctly.
226 File send OK.
2352 bytes received in 0 secs (78 Kbytes/sec)
ftp> bye
221 Goodbye.
/var/other1> ls
EKI eki eth0
/var/other1>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.8 FTP Client in EKI-1121/1122/1124

‘172.21.73.74’ is another computer’s IP address.

3.2.5 TFTP Service and Client

When boot up the EKI-1121L/1122L/1124L, the tftp service is already started by default. User can tftp to EKI-1121L/1122L/1124L by tftp client in another computer. Use command to get and put file like this:

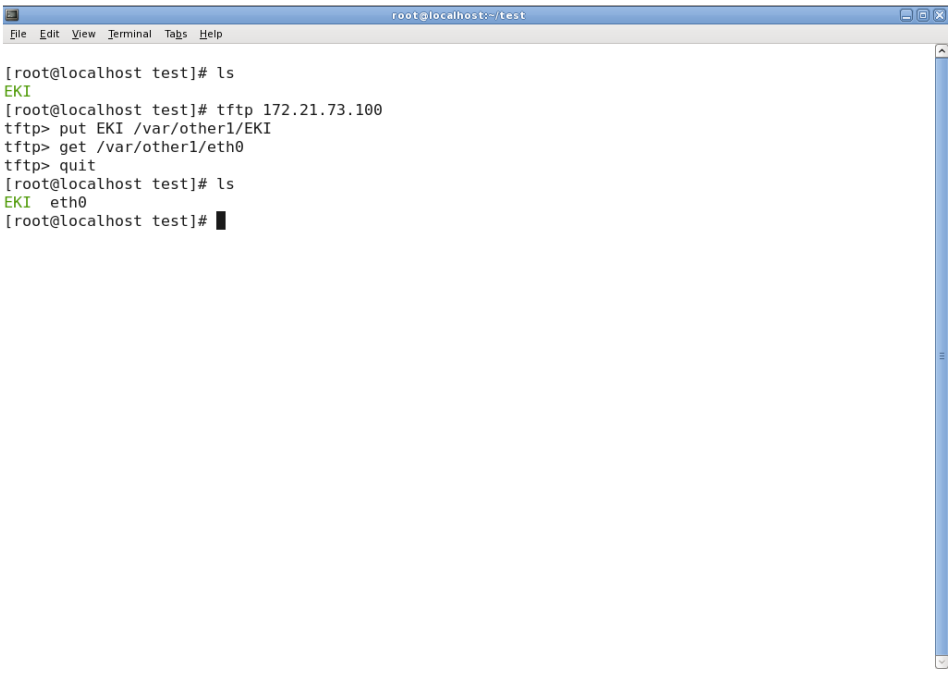

Figure 3.9 TFTP Client in Another Computer

‘172.21.73.100’ is your EKI-1121L/1122L/1124L’s IP address. In ‘get’ command line, user must use full path of file that will be received from EKI-1121L/1122L/1124L. In ‘put’ command line, user must use full path of file of EKI-1121L/1122L/1124L and file name must be the same as that will be put. If user wants to connect another computer by tftp client in EKI-1121L/1122L/1124L, use command to get and put file like this:

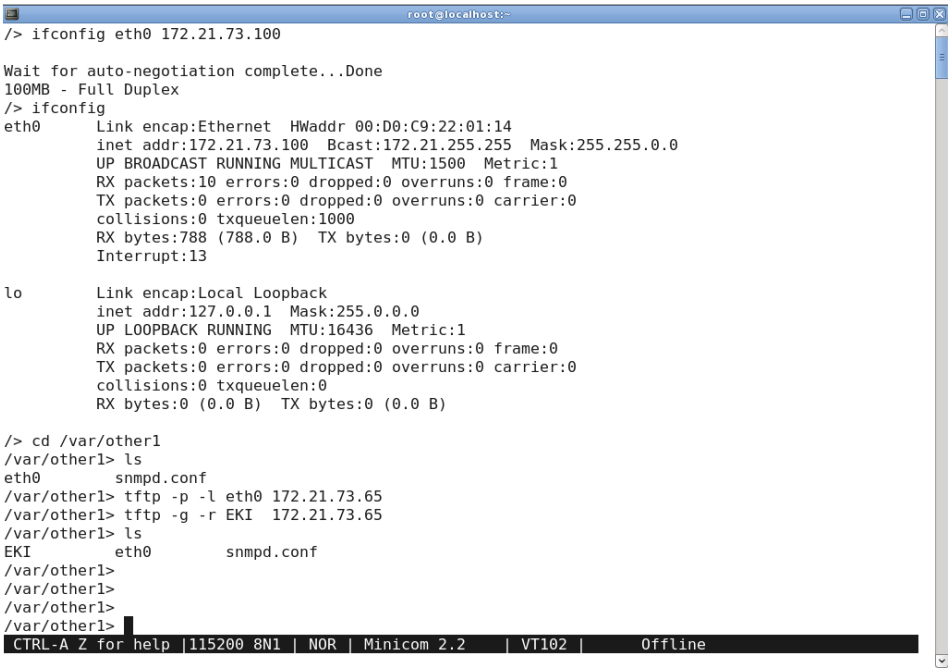
root@localhost:~
/> ifconfig eth0 172.21.73.100
Wait for auto-negotiation complete...Done
100MB - Full Duplex
/> ifconfig
eth0 Link encap:Ethernet HWaddr 00:D0:C9:22:01:14
inet addr:172.21.73.100 Bcast:172.21.255.255 Mask:255.255.0.0
UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
RX packets:10 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:1000
RX bytes:788 (788.0 B) TX bytes:0 (0.0 B)
Interrupt:13
lo Link encap:Local Loopback
inet addr:127.0.0.1 Mask:255.0.0.0
UP LOOPBACK RUNNING MTU:16436 Metric:1
RX packets:0 errors:0 dropped:0 overruns:0 frame:0
TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
collisions:0 txqueuelen:0
RX bytes:0 (0.0 B) TX bytes:0 (0.0 B)
/> cd /var/other1
/var/other1> ls
eth0 snmpd.conf
/var/other1> tftp -p -l eth0 172.21.73.65
/var/other1> tftp -g -r EKI 172.21.73.65
/var/other1> ls
EKI eth0 snmpd.conf
/var/other1>
/var/other1>
/var/other1>
/var/other1>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.10 TFTP in EKI-1121L/1122L/1124L

‘172.21.73.65’ is another computer’s IP address. User can use “tftp –g –r ….” to send file to another computer and use “tftp –p –l ….” to get file from another computer.

3.2.6 NFS Client

User can mount file system to EKI-1121L/1122L/1124L provided by another computer with NFS service. Use ‘mount’ command like this:

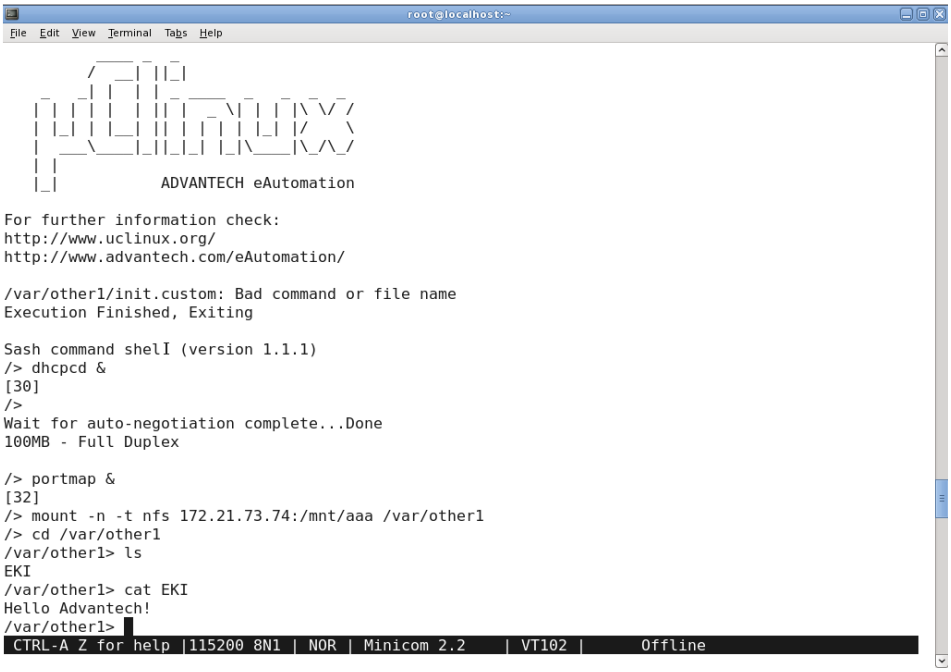

Figure 3.11 NFS Client in EKI-1121L/1122L/1124L

‘172.21.73.74’ is another computer’s IP address. ‘/mnt/aaa’ is file system supported by another computer. User can mount it to EKI-1121L/1122L/1124L.

3.2.7 NTP Client

User can synchronize time on EKI-1121L/1122L/1124L by using ntp client. Use ‘msntp’ command like this:

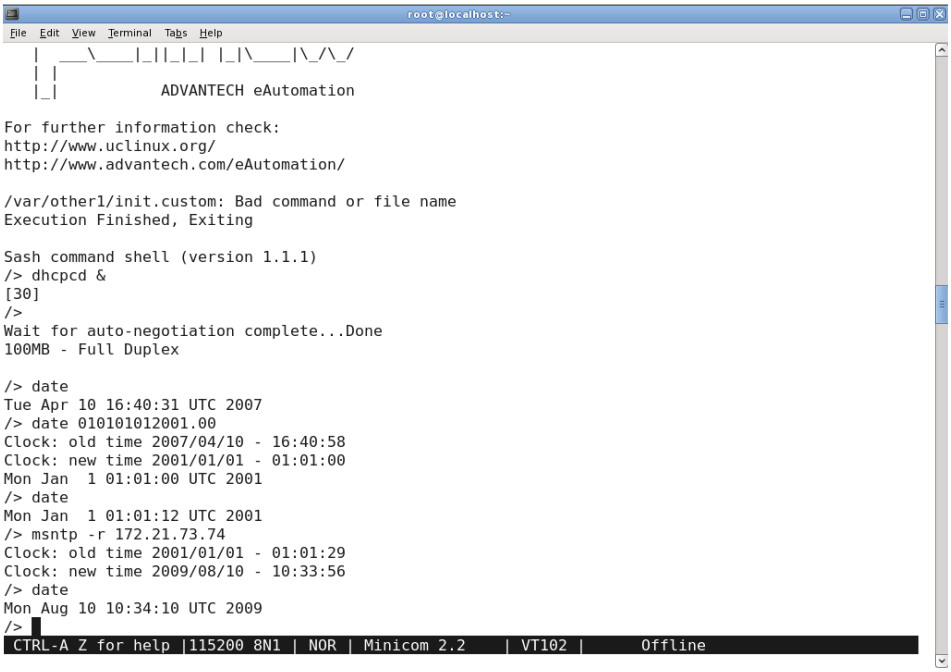
root@localhost:~
File Edit View Terminal Tabs Help
ADVANTECH eAutomation
For further information check:
http://www.uclinux.org/
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (version 1.1.1)
/> dhcpcd &
[30]
/>
Wait for auto-negotiation complete...Done
100MB - Full Duplex
/> date
Tue Apr 10 16:40:31 UTC 2007
/> date 010101012001.00
Clock: old time 2007/04/10 - 16:40:58
Clock: new time 2001/01/01 - 01:01:00
Mon Jan 1 01:01:00 UTC 2001
/> date
Mon Jan 1 01:01:12 UTC 2001
/> msntp -r 172.21.73.74
Clock: old time 2001/01/01 - 01:01:29
Clock: new time 2009/08/10 - 10:33:56
/> date
Mon Aug 10 10:34:10 UTC 2009
/>
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 3.12 NTP Client in EKI-1121L/1122L/1124L

‘172.21.73.74’ is NTP server’s IP address.

3.2.8 SNMP Service

The EKI-1121L/1122L/1124L has built-in SNMP (Simple Network Management Protocol) v1 and v2c agent software.

When boot up the EKI-1121L/1122L/1124L, the snmp client is not started by default, user must start snmp serveice like this:

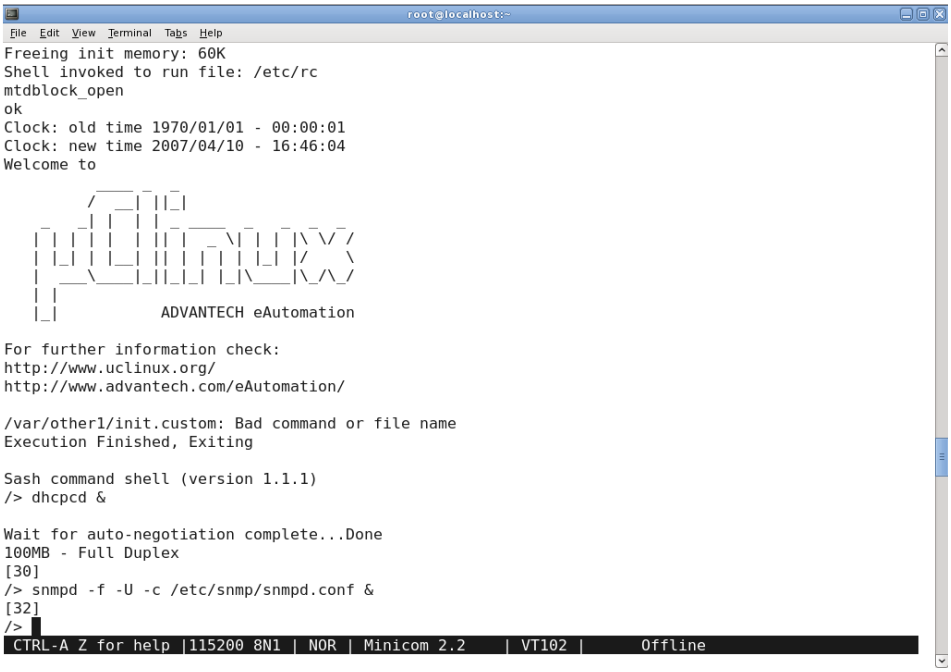

Figure 3.13 SNMP Client in EKI-1121L/1122L/1124L

Then user can manage EKI-1121L/1122L/1124L by snmp service in another computer, use ‘snmpwalk’ command like this:

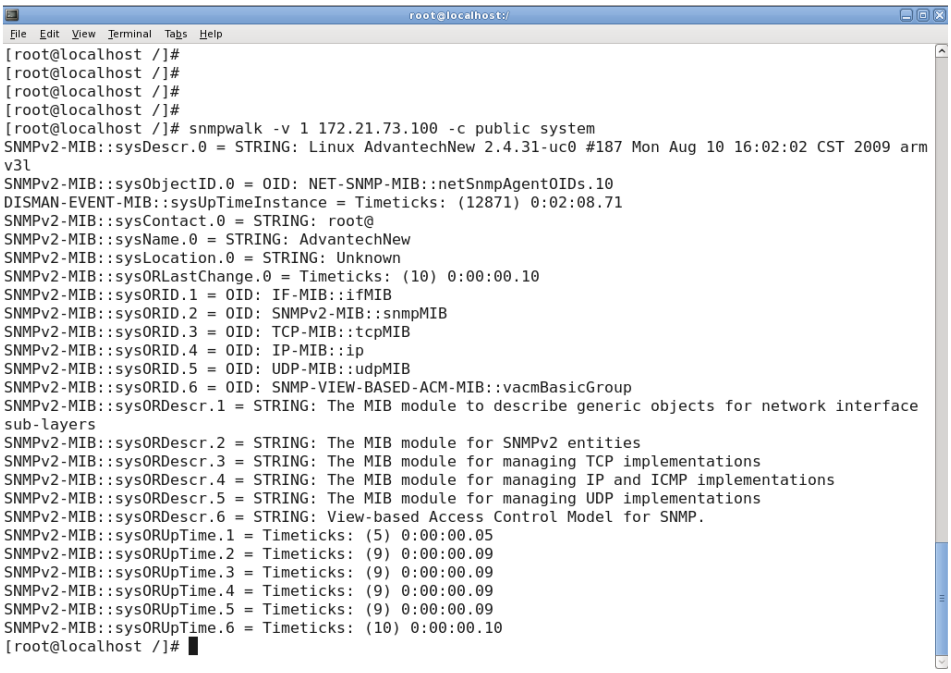
root@localhost:/
File Edit View Terminal Tabs Help
[root@localhost /]#
[root@localhost /]#
[root@localhost /]#
[root@localhost /]#
[root@localhost /]# snmpwalk -v 1 172.21.73.100 -c public system
SNMPv2-MIB::sysDescr.0 = STRING: Linux AdvantechNew 2.4.31-uc0 #187 Mon Aug 10 16:02:02 CST 2009 arm v3l
SNMPv2-MIB::sysObjectID.0 = OID: NET-SNMP-MIB::netSnmpAgentOIDs.10
DISMAN-EVENT-MIB::sysUpTimeInstance = Timeticks: (12871) 0:02:08.71
SNMPv2-MIB::sysContact.0 = STRING: root@
SNMPv2-MIB::sysName.0 = STRING: AdvantechNew
SNMPv2-MIB::sysLocation.0 = STRING: Unknown
SNMPv2-MIB::sysORLastChange.0 = Timeticks: (10) 0:00:00.10
SNMPv2-MIB::sysORID.1 = OID: IF-MIB::ifMIB
SNMPv2-MIB::sysORID.2 = OID: SNMPv2-MIB::snmpMIB
SNMPv2-MIB::sysORID.3 = OID: TCP-MIB::tcpMIB
SNMPv2-MIB::sysORID.4 = OID: IP-MIB::ip
SNMPv2-MIB::sysORID.5 = OID: UDP-MIB::udpMIB
SNMPv2-MIB::sysORID.6 = OID: SNMP-VIEW-BASED-ACM-MIB::vacmBasicGroup
SNMPv2-MIB::sysORDescr.1 = STRING: The MIB module to describe generic objects for network interface sub-layers
SNMPv2-MIB::sysORDescr.2 = STRING: The MIB module for SNMPv2 entities
SNMPv2-MIB::sysORDescr.3 = STRING: The MIB module for managing TCP implementations
SNMPv2-MIB::sysORDescr.4 = STRING: The MIB module for managing IP and ICMP implementations
SNMPv2-MIB::sysORDescr.5 = STRING: The MIB module for managing UDP implementations
SNMPv2-MIB::sysORDescr.6 = STRING: View-based Access Control Model for SNMP.
SNMPv2-MIB::sysORUpTime.1 = Timeticks: (5) 0:00:00.05
SNMPv2-MIB::sysORUpTime.2 = Timeticks: (9) 0:00:00.09
SNMPv2-MIB::sysORUpTime.3 = Timeticks: (9) 0:00:00.09
SNMPv2-MIB::sysORUpTime.4 = Timeticks: (9) 0:00:00.09
SNMPv2-MIB::sysORUpTime.5 = Timeticks: (9) 0:00:00.09
SNMPv2-MIB::sysORUpTime.6 = Timeticks: (10) 0:00:00.10
[root@localhost /]#

Figure 3.14 SNMP Message in Manage Computer

And user can modify /var/other1/snmpd.conf which is linked to /etc/snmpd.conf to change configuration.

3.2.9 Mail Client

EKI-1121L/1122L/1124L use smtpclient to send mail which is a minimal SMTP client that takes an email message body and passes it on to an SMTP server. When boot up the EKI-1121L/1122L/1124L, the smtp client is already started by default. User can send mail via smtp server. Use ‘mail’ command to send mail like this:

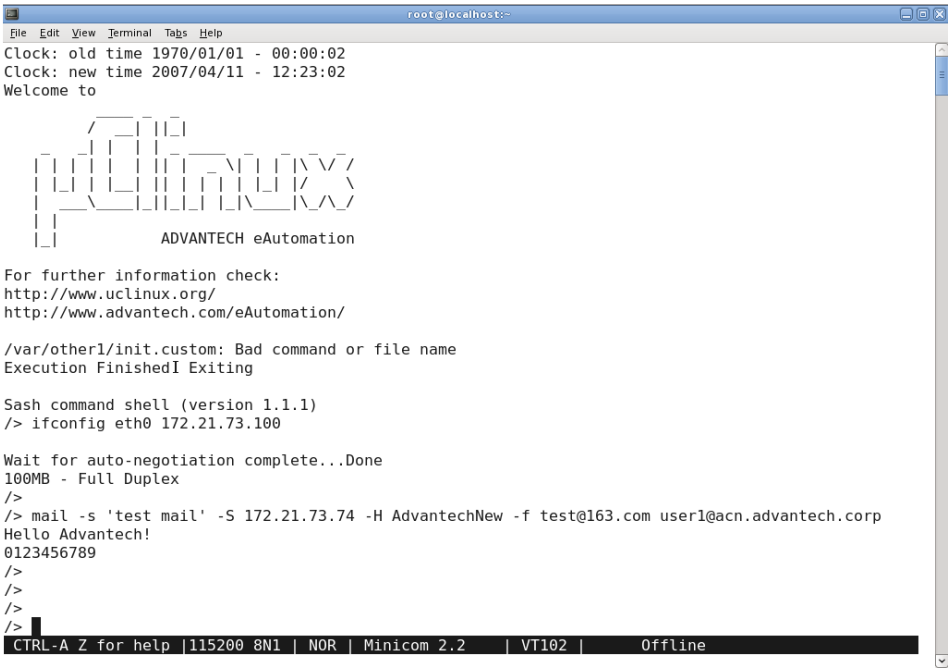

Figure 3.13 MAIL Client in EKI-1121/1122/1124

‘172.21.73.74’ is smtp server’s IP address. ‘AdvantechNew’ defined in /etc/resolve.conf is locale host name. ‘test’ is sender mail name and ‘user1’ is receiver mail name. After input ‘mail’ command line and Press enter key, you can input context of mail and press CTRL+D to send & exit.

3.2.10 Web Server

The boa is a small web server .If you want the web server starting by default, user must add ‘boa:unknown:/bin/boa -c /www &’ to /etc/inittab. To use web server, user can use vi to modify /var/other1/www/boa.conf which is released from other1.tar.gz like this:

```
Port 80
User 0
Group 0
DocumentRoot /www
```

```
UserDir public_html
DirectoryIndex index.htm
KeepAliveMax 1000
KeepAliveTimeout 10
DefaultType text/html
AddType application/x-httpd-cgi cgi
ScriptAlias /cgi-bin/      /www/cgi-bin/
AddType image/jpeg jpg
```

Because the default homepage is already located at /var/other1/www/index.htm released from other1.tar.gz, user can open default page. Type “http://’IP_address’” (‘IP_address’ is web server’s LAN IP address which is still active.) in the address box of a browser (such as Microsoft Internet Explorer or Mozilla Firefox) from your PC. And user can open default CGI page, type “http://’IP_address’/cgi-bin/hello.cgi” in your browser’s address box.

If user wants to make your pages. You can do it like this:

Firstly, save your own homepage to the following directory:/var/other1/www/.And then save your CGI page to the following directory: /var/other1/www/cgi-bin.

After that, you can browse to EKI-1121/1122/1124 by web browser in another computer.

3.2.11 PPP Client

Before use it, user must open and modify /var/other1/ppp-on firstly.

```
#!/bin/sh
DEV=/dev/ttyS3
BAUDRATE=115200
NAME=USERNAME
DIAL_SCRIPT=/var/other1/ppp-on-dialer
pppd lock modem crtscts asyncmap 20A0000 escape FF $DEV $BAUDRATE
noipdefault defaultroute noauth name $NAME connect $DIAL_SCRIPT
```

Please replace ‘/dev/ttyS3’ and ‘115200’ with correct serial port and baud rate. And replace ‘USERNAME’ with login account.

Secondly, user must open and modify /var/other1/ppp-on-dialer.

```
#!/bin/sh
TELEPHONE=NUMBER
HANGUP=ATH0
RESET_MODEM=ATZ
```

```
INIT_MODEM=ATL1M1V1S11=55S7=75
DIAL=ATDT$TELEPHONE
chat ABORT 'ERROR' ABORT 'BUSY' ABORT 'NO ANSWER' ABORT
'RING\r\n\r\nRING' '' AT 'OK-+++\c-OK' $HANGUP OK $RESET_MODEM OK
$INIT_MODEM TIMEOUT 30 OK $DIAL CONNECT ''
```

Please replace ‘NUMBER’ with the telephone number.

Use the following command to launch the ppp connection.

```
/>/var/other1/ppp-on &
```

After the connection is built, a new Ethernet interface ppp will attach to system.

3.2.12 PPPoE client

Before use it, user must open and modify /var/other1/pppoe-on firstly.

```
#!/bin/sh
USER=USERNAME
pppd debug lock usepeerdns noipdefault noauth defaultroute local name $USER pty
/var/other1/pppoe-dialer
```

Please replace ‘USERNAME’ with correct user name.

Secondly, user must open and modify /var/other1/pppoe-dialer.

```
#!/bin/sh
ifconfig eth0 up
pppoe -p /var/run/adsl.pid -I eth0 1412
```

Please replace ‘eth0’ with correct interface of Ethernet.

Thirdly, user must open and modify /var/other1/pppoe.conf.

```
ETH=eth0
USER=USERNAME
DEMAND=no
USEPEERDNS=yes
CONNECT_TIMEOUT=60
CONNECT_POLL=6
PING="."
PIDFILE=/var/run/adsl.pid
SYNCHRONOUS=no
CLAMPMSS=1412
LCP_INTERVAL=20
LCP_FAILURE=3
PPPOE_TIMEOUT=80
FIREWALL=NONE
```

```
PPPOE_EXTRA=""
```

Please replace ‘USERNAME’ with correct user name and ‘eth0’ with correct interface of Ethernet.

Fourthly, user must open and modify /var/other1/www/chap–secrets.

```
"USERNAME"    *     "PASSWORD"    *
```

Please replace ‘USERNAME’ with correct user name and ‘PASSWORD’ with correct password.

At last, user must open and modify \var\other1\www\pap-secrets.

```
"USERNAME"    *     "PASSWORD"    *
```

Please replace ‘USERNAME’ with correct user name and ‘PASSWORD’ with correct password.

Use the following command to launch the pppoe connection.

```
/>/var/other1/pppoe-on &
```

After the connection is built, a new Ethernet interface ppp will attach to system.

3.3 Partition of Flash

As mentioned before, the flash has 4 partitions: The first is used by boot loader; the second is used by uClinux kernel; the third is used by root file system and the forth is reserved for user use. It is about 2.6 MB, identified as /dev/mtdblock3 and mounted at /var/other1.

Redboot	0x 0000 0000 ~ 0x 7F06 0000
linux.bin.lzo	0x 7F06 0000 ~ 0x 7F16 0000
romfs.img	0x 7F16 0000 ~ 0x 7F56 0000
user space	0x 7F56 0000 ~ 0x 7F7F 0000
FIS directory	0x 7F7F 0000 ~ 0x 7F7F F000
Redboot config	0x 7F7F F000 ~ 0x 7F80 0000

Chapter 4: Development Guide

4.1 Establish Develop Environment

4.1.1 Install the Cross Compile Tool Chain

Install Linux distribution on your host computer.
Use root account to login system.
Put arm-uclinux-tool-20080121-advantech.tar.bz2 under “\” path. You can find the file at release\toolchain\linux\.
Use “tar jxvf arm-uclinux-tool-20080121-advantech.tar.bz2” to uncompress the tool chain.
The tool chain has been installed into your system.

4.1.2 Setup the Runtime Environment

1. Use the account who wants to use this tool chain to login.
2. Append /usr/local/arm-uclinux-tool-20080121/bin to environment variant PATH and export it.
3. Add following line into .bash_profile. (According to the different shell you use, the configuration file name maybe different.)

```
export PATH=/usr/local/arm-uclinux-tool-20080121/bin:PATH
```

4. Re-login the account.
5. Use ‘whereis arm-elf-gcc’ or ‘which arm-elf-gcc’ command to make sure the command points to the correct arm-elf tool chain.
6. Use ‘arm-elf-gcc -v’ command to make sure you are using the correct version of arm-elf tool chain.
7. Now the development environment is established.

4.2 Put Applications into

4.2.1 Check the Flash Memory Space

Sometimes, user want execute applications in file system of EKI-1121L/1122L/1124L,
To build the example application “hello”, use the following process.

1. Copy the files “hello.c” and “Makefile” to your working directory.

2. Change to your working directory and issue the command “make” to build the application. When successfully built, you should see the following. Then copy hello to /home/aaa .

Figure 4.1 How to make hello

3. To test the application, place the file “hello” on an ftp server. Next, connect to the EKI-112x via console or telnet, and change to the “/var/other1“ directory. Use the following commands to ftp the file “hello” from the ftp server.
4. Change the file permissions as follows.
5. Finally use the following command to execute the program.

Figure 4.2 How to get hello via FTP

4.2.2 User Space via FTP

Sometimes, user wants to execute applications in file system of EKI-1121L/1122L/1124L. Please use the following commands to get and execute the files.

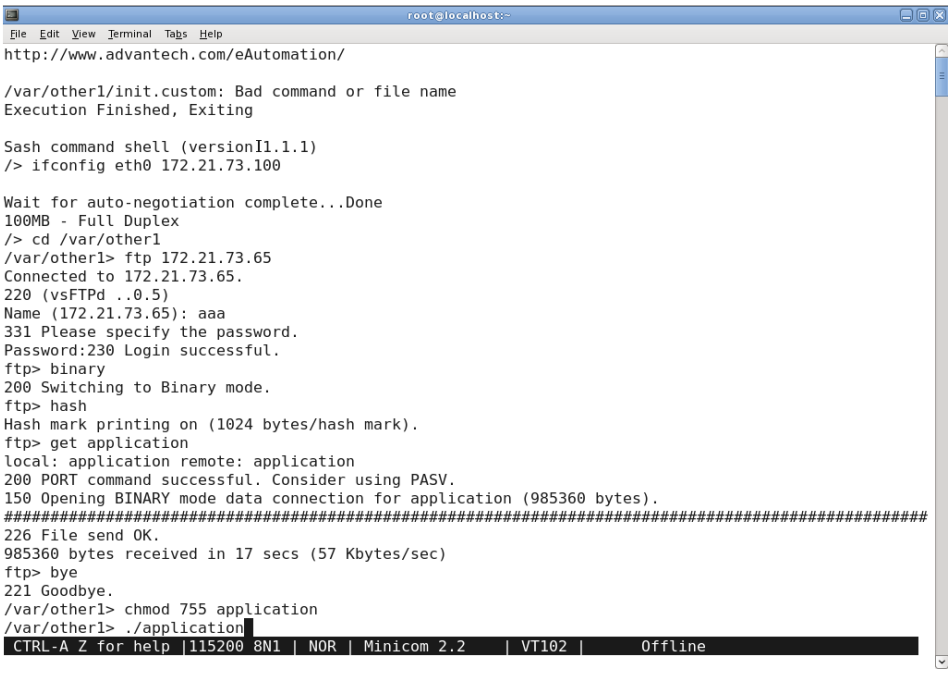
root@localhost:~
File Edit View Terminal Tabs Help
http://www.advantech.com/eAutomation/
/var/other1/init.custom: Bad command or file name
Execution Finished, Exiting
Sash command shell (versionI1.1.1)
/> ifconfig eth0 172.21.73.100
Wait for auto-negotiation complete...Done
100MB - Full Duplex
/> cd /var/other1
/var/other1> ftp 172.21.73.65
Connected to 172.21.73.65.
220 (vsFTPd ..0.5)
Name (172.21.73.65): aaa
331 Please specify the password.
Password:230 Login successful.
ftp> binary
200 Switching to Binary mode.
ftp> hash
Hash mark printing on (1024 bytes/hash mark).
ftp> get application
local: application remote: application
200 PORT command successful. Consider using PASV.
150 Opening BINARY mode data connection for application (985360 bytes).
226 File send OK.
985360 bytes received in 17 secs (57 Kbytes/sec)
ftp> bye
221 Goodbye.
/var/other1> chmod 755 application
/var/other1> ./application
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure 4.2 How to Get Applications via FTP

4.2.3 Root File-system

1. Uncompress romfs.tar.bz2 to a temporary folder.

```
tar jxvf romfs.tar.bz2
```

2. Put your applications to relative directory or modify the configuration files as you want.
3. Use following command to generate a new root file system.

```
genromfs -v -V “ROMdisk” -f romfs.img -d romfs
```

4. Refer to Appendix A to update root file system.

4.3 Device APIs

4.3.1Serial port APIs

Each serial port has an associated device file. To access a serial port, you simply open the corresponding device file.

Peripheral	Device File
Serial Port 1	/dev/ttyS2
Serial Port 2	/dev/ttyS3
Serial Port 3	/dev/ttyS4
Serial Port 4	/dev/ttyS5

Port configuration is done using the POSIX termios interface. Developing in C, you will first need to include the <termios.h> header file to use the required functions.
Additionally, the serial port line drivers are software configurable for RS-232, RS-422 or RS-485 operation, through the termios interface. You will need to include the adv.h header file or the following defines.

```
#define IRS422    0100000
#define IRS485    0200000
```

Then, use the following instructions to set the termios structure, followed by the tcsetattr function to set the new configuration.

```
switch(gMode) {
    case MODE_RS232:
        PortTermios.c_iflag &= ~IRS422;
        PortTermios.c_iflag &= ~IRS485;
        break;
    case MODE_RS422:
        PortTermios.c_iflag |= IRS422;
        PortTermios.c_iflag &= ~IRS485;
        break;
    case MODE_RS485:
        PortTermios.c_iflag &= ~IRS422;
        PortTermios.c_iflag |= IRS485;
        break;
}

  //Set the new serial port interface type
  tcsetattr(portHandle, TCSANOW, &PortTermios);
```

For a complete example of serial port configuration, please see the provided `serialecho.c` example.

4.3.2 RTC APIs

To access a RTC device, you simply open the corresponding device file.

Peripheral	Device File
Real Time Clock	/dev/rtc

4.3.3 LED APIs

To access a LED device, you simply open the corresponding device file.

Peripheral	Device File
LED Indicator	/dev/led

Developing in C, you will first need to include the <stdio.h> <sys/types.h> <sys/ioctl.h> <unistd.h> and "ledman.h" header file to use the required functions.

Then, use the following program to set the command, followed by the ioctl function to control leds.

```
if(flag)
{
    flag = 0;
    cmd = LEDMAN_CMD_ON;
    /*your action*/
}
else
{
    flag = 1;
    cmd = LEDMAN_CMD_OFF;
    /*your action*/
}
if( ioctl(devfp, cmd, LEDMAN_HEARTBEAT) < 0
    || ioctl(devfp, cmd, LEDMAN_RESET) < 0 )
{
     /*your action*/
}
```

For a complete example of serial port configuration, please see the provided `lmtest.c` example.

Chapter 5: Troubleshooting

Appendix A: Restore the Platform Kernel

Just in case if the kernel or flash is corrupted, follow the below steps to recover the kernel and root file system.

1. Connect the EKI-1121L/1122L/1124L with console.
2. Press Ctrl + C when power on the EKI-1121L/1122L/1124L.
3. You should see the following messages.
4. Start your TFTP server and put the kernel.lzo and romfs.img under the TFTP directory.
5. Assume your TFTP server's IP is 172.21.73.65. Use the following commands.

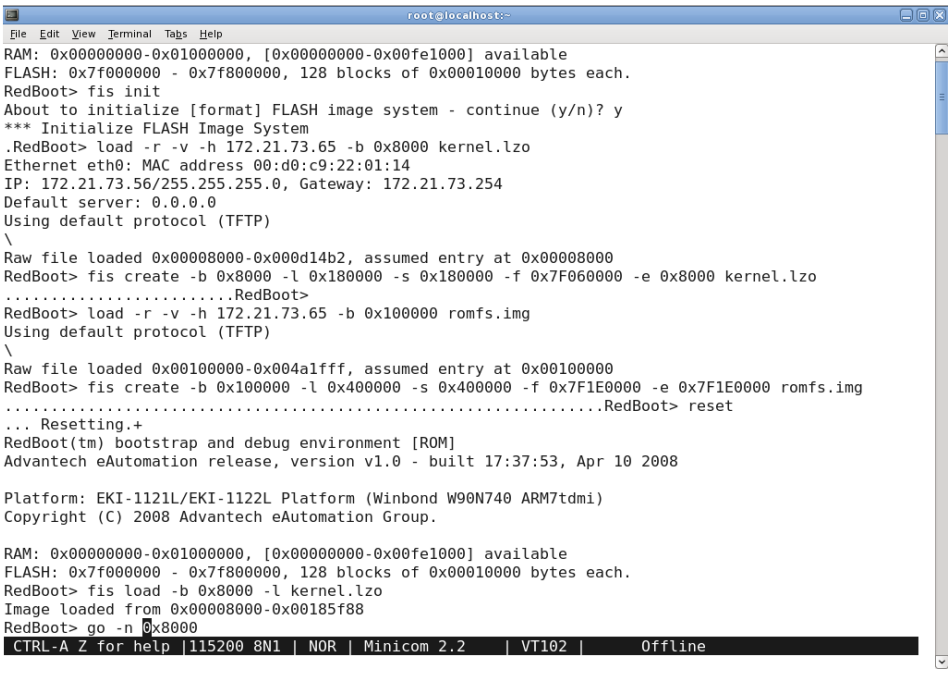
root@localhost:~
File Edit View Terminal Tabs Help
RAM: 0x00000000-0x01000000, [0x00000000-0x00fe1000] available
FLASH: 0x7f000000 - 0x7f800000, 128 blocks of 0x00010000 bytes each.
RedBoot> fis init
About to initialize [format] FLASH image system - continue (y/n)? y
*** Initialize FLASH Image System
.RedBoot> load -r -v -h 172.21.73.65 -b 0x8000 kernel.lzo
Ethernet eth0: MAC address 00:d0:c9:22:01:14
IP: 172.21.73.56/255.255.255.0, Gateway: 172.21.73.254
Default server: 0.0.0.0
Using default protocol (TFTP)
\
Raw file loaded 0x00008000-0x000d14b2, assumed entry at 0x00008000
RedBoot> fis create -b 0x8000 -l 0x180000 -s 0x180000 -f 0x7F060000 -e 0x8000 kernel.lzo
.....................RedBoot>
RedBoot> load -r -v -h 172.21.73.65 -b 0x100000 romfs.img
Using default protocol (TFTP)
\
Raw file loaded 0x00100000-0x004a1fff, assumed entry at 0x00100000
RedBoot> fis create -b 0x100000 -l 0x400000 -s 0x400000 -f 0x7F1E0000 -e 0x7F1E0000 romfs.img
....RedBoot> reset
... Resetting.+
RedBoot(tm) bootstrap and debug environment [ROM]
Advantech eAutomation release, version v1.0 - built 17:37:53, Apr 10 2008
Platform: EKI-1121L/EKI-1122L Platform (Winbond W90N740 ARM7tdmi)
Copyright (C) 2008 Advantech eAutomation Group.
RAM: 0x00000000-0x01000000, [0x00000000-0x00fe1000] available
FLASH: 0x7f000000 - 0x7f800000, 128 blocks of 0x00010000 bytes each.
RedBoot> fis load -b 0x8000 -l kernel.lzo
Image loaded from 0x00008000-0x00185f88
RedBoot> go -n 0x8000
CTRL-A Z for help |115200 8N1 | NOR | Minicom 2.2 | VT102 | Offline

Figure A.1 How to Recover Kernel and Root File System

6. After restart the EKI-1121L/1122L/1124L, the kernel and root file system should be recovered.

Appendix B: Erase JFFS2 File System

1. Sometimes, you may encounter the issue during development. You may see the output message like below.

```
mtdblock_open
ok
jffs2_scan_empty(): Empty block at 0x003142e4 ends at 0x00316000 (with
0x00000000)! Marking dirty
JFFS2: Erase block at 0x00310000 is not formatted. It will be erased
Cowardly refusing to erase blocks on filesystem with no valid JFFS2 nodes
mtdblock_release
ok
mount: wrong fs type, bad option, bad superblock on /dev/mtdblock3,
        missing codepage or other error
mtdblock_open
ok
mtdblock_release
ok
        In some cases useful info is found in syslog - try
        dmesg | tail    or so

pid 14: failed 8192
```

2. Try to use following command to solve this issue.

```
Sash command shell (version 1.1.1)
/> umount /var/other1
/> eraseall /dev/mtd3
MTD_open
MTD_ioctl
Erasing 64 Kibyte @ 0 --    0 % complete.MTD_ioctl
Erasing 64 Kibyte @ 10000 --    1 % complete.MTD_ioctl
Erasing 64 Kibyte @ 20000 --    3 % complete.MTD_ioctl
. . . . . .
Erasing 64 Kibyte @ 3c0000 -- 95 % complete.MTD_ioctl
Erasing 64 Kibyte @ 3d0000 -- 96 % complete.MTD_ioctl
Erasing 64 Kibyte @ 3e0000 -- 98 % complete.MTD_ioctl
Erased 4032 Kibyte @ 0 -- 100% complete.
MTD_close
/>reboot
```

3. Restart the device.

Appendix C: Command Collection

File manager

1.mount: Mount a filesystem. You need this to access NFS and SMB filesystems.

2.umount: Unmount a filesystem.

3.ar: Extract or list files from an ar archive.

4.basename: Strips directory path and suffixes from FILE. If specified, also removes any trailing SUFFIX.

5.cp: Copy files.

6.dd: Copy a file with formatting and conversions.

7.df: Print the filesystem space used and space available.

8.dirname: Strips non-directory suffix from arguments.

9.du: Summarizes disk space used for each file argument and/or directory. Disk space is printed in units of 1024 bytes

10.gunzip: Uncompress files.

11.gzip: Compress files.

12.ln: Create a link between two files.

13.ls: List directory contents.

14.mkdir: Create directory(ies), if they do not already exist.

15.mkfifo: Creates a named pipe.

16.knod: Create a special file (block, character, or pipe).

17.mv: Move (rename) files.

18.pwd: Print the full filename of the current working directory.

19.rm: Remove (unlink) the file(s). You may use '--' to indicate that all following arguments are non-options.

20.rmdir: Remove the directory(ies), if they are empty.

21.sync: Write all buffered filesystem blocks to disk.

Editor

22.cat: Concatenates FILE(s) and prints them to stdout.

23.cmp: Compare files.

24.cut: Prints selected fields from input file to standard out.

25.echo: Prints arguments to stdout.

26.find: Search for files in a directory hierarchy.

27.grep: Search for a pattern in each file or standard input.enable context :

Support for the EGREP applet (alias to the grep applet). Alias egrep to grep -e : Support for the EGREP applet (alias to the grep applet)

28.more: More is a filter for viewing a file one screenful at a time.

29.sed: Stream editor.

30.sort: Sorts lines of text in the specified files.

31.tail: Print last 10 lines of each file to standard output. With more than one file, precede each with a header giving the file name. With no file, or when file is -, read standard input.

32.tee: Copy standard input to each file, and also to standard output.

33.test: Checks file types and compares values returning an exit code determined by the value of an expression.

34.top :

35.touch: Update the last-modified date on the given file[s].

36.tr: Translate, squeeze, and/or delete characters from standard input,writing to standard output.

37.vi: Visual file editor.

Network

38.boa:

39.dhcpcd: The DHCP client daemon, used to get an IP address from a DHCP server.

40.ftp: An ftp client

41.ftpd:

42.inetd:

43.mail: Client which allows mail to be sent to other hosts that support SMTP

44.msntp: Simple Network Time Protocol utility.

45.portmap: The portmapper service, needed for NFS under 2.4.

46.pppd: Dialup networking daemon.

47.pptpd: PPTP VPN daemon.

48.pptp: PPTP Client for establishing VPN's.

49.rp_pppoe: The Roaring Penguin PPPOE.

50.telnetd: Allow remote users to login to the system using telnet.

51.telnet: A telnet client application.

52.tftpd: A tftp server

53.chat: The chat command is used for PPP and other processes that need to talk to modems.

54.hostname: Get or set the hostname or DNS domain name.

55.ifconfig: Configure a network interface.

56.iproute: Equivalent to selecting route support to "ip", above.

57.netstat: netstat prints information about the Linux networking subsystem.

58.nslookup: Queries the nameserver for the IP address of the given host.

59.ping: Send ICMP ECHO_REQUEST packets to network hosts.

60.route: Edit the kernel's routing tables.

61.tftp: Transfers a file from/to a tftp server using "octet" mode.

put: Support the TFTP PUT command.

get: Support the TFTP GET command.

62.traceroute :Print the route packets take to a network host.

63.wget: Retrieves files via HTTP or FTP.

Process

64.kill: Send a signal to the specified process(es).

65.killall : Send a signal to the specified process(es)

66.ps: Report process status. This version of ps accepts no options.

Others

67.cpu: cpu tool

68.setserial: User level serial port configuration tool.

69.clear: Clear screen.

70.date: Displays the current time or sets the system date.

71.dmesg: Prints or controls the kernel ring buffer.

72.hwclock: The hwclock utility is used to read and set the hardware clock on a system. This is primarily used to set the current time on shutdown in the hardware clock, so the hardware will keep the correct time when Linux is _not_ running.

73.mesg: Mesg controls access to your terminal by others. It is typically used to allow or disallow other users to write to your terminal

74.reboot: Reboot the system.

75.sleep : Pause for a specified number of seconds.

76.time:

77.TTY: Print the file name of the terminal connected to standard input.

78.uname: Print certain system information.

79.uptime: Display the time since the last boot.

80.usleep: Pause for N microseconds.

81.yes: Repeatedly outputs a line with all specified string(s), or 'y'.